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Patterns and Intensity of Use of Homeless Shelters in Toronto

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Analysant un vaste ensemble de données administratives, les auteurs étudient l'utilisation des refuges à Toronto et observent d'importants écarts à ce chapitre entre les adultes célibataires, les jeunes et les familles. La méthode qu'ils proposent leur permet de relever une augmentation notable dans le pourcentage de la clientèle des refuges qu'ils considèrent, par définition, comme des utilisateurs chroniques du système de refuges — c'est-à-dire des utilisateurs dont chaque séjour est habituellement très long. Cette situation devrait préoccuper, puisque les utilisateurs chroniques du système, même s'ils ne représentent qu'un faible pourcentage de l'ensemble de la clientèle des refuges, mobilisent plus de 40 pour cent de la capacité de ces lieux d'hébergement. Le nombre croissant d'utilisateurs chroniques des refuges compromettra la capacité du système à héberger ceux et celles qui cherchent une aide provisoire, le temps de pouvoir se reloger. L'offre de refuges aux itinérants est une réponse à un grave problème social. Elle n'en est ni la cause ni la solution. L'utilisation croissante des refuges est un indicateur de perturbation de l'ordre social.

Mots clés : analyse typologique, chronique lutte contre l'itinérance, refuges

A large administrative data set allows us to examine shelter use by single adults, youth, and families in Toronto. We find important differences in shelter use by single adults, youth, and families. We introduce an approach that allows us to identify a noticeable increase in the percentage of shelter clients whom we define as chronic users of the shelter system—people for whom each episode of shelter use is typically very long. This should be a concern because chronic users of the system, although they make up only a small fraction of all shelter clients, fill more than 40 percent of shelter capacity. A growing number of chronic shelter users will strain the ability of the shelter system to provide shelter to those seeking temporary relief while they re-establish themselves into housing. Homeless shelters are a response to a serious social problem. They are not the cause of nor are they the solution to that problem. Growing shelter use is an indication of a social order in trouble.

Keywords: homelessness, shelters, cluster analysis, chronic users

Introduction

How do people in need use homeless shelters? Are shelters used as a temporary refuge, perhaps as a result of an unexpected crisis, or are they used more as a permanent source of housing? Are the majority of people using a shelter for the first time, or are most shelter clients repeat users? Are shelter users young or old, and are they single or are they in families? At the very least, the answers to these kinds of questions are important for directing limited resources to where they can be put to best use.

Answers to these questions also provide at least some insight into the causes of shelter use. Although early research into explanations for homelessness emphasizes the characteristics of individuals and tends to associate homelessness with drug abuse and mental illness, more recently what has been referred to as the "new orthodoxy" stresses the additional and perhaps primary roles played by poverty and interpersonal relationships.[1] Culhane and Metraux (2008), for example, emphasize the considerable overlap of those using shelters with the population that is poor and precariously housed. Culhane, Lee, and Wachter (1996) similarly show that most families admitted to shelters in New York and Philadelphia previously lived in parts of those cities associated with very low incomes, higher rates of unemployment, labour force nonparticipation, and high rent-to-income ratios.[2] The importance of poverty as an explanation for homelessness suggests that information on shelter use provides useful information on the efficacy of social assistance programs and the significance of tight housing and labour markets for those with low incomes. These understandings may thus provide, much like a canary in a mine shaft, an early indication of

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a social order in trouble. Simply put, determining patterns of shelter use is an important step in understanding the causes of homelessness and, once causes are identified, what might be effective public policy reactions.[3]

In this article, we identify the frequency and patterns of use among people experiencing homelessness who use shelters. Our focus is on shelter use in Toronto, but we compare our results with those reported using similar methodologies and data describing shelter use in other large North American cities. We use an empirical approach that is well established in the literature and has been used to examine emergency shelter use by single adults in New York and Philadelphia (Kuhn and Culhane 1998) and in Calgary (Kneebone et al. 2015) and by single adults and youth in Toronto, Guelph, and Ottawa (Aubry et al. 2013). The size and breadth of our data set allow us to broaden the study of shelter use in Toronto to separately identify differences in the pattern of shelter use by families from the patterns and intensity of use by youth and by single adults.[4] To our knowledge, ours is the only Canadian study that uses cluster analysis to identify the patterns and intensity of use of shelters by families,[5] and it is the only study to compare and contrast shelter use across all types of shelter programs, those for families, youth, and single adults, all in a single city over the same period and so subject to the same economic and social conditions. Finally, in this article we introduce an effort to show how patterns of shelter use change over time, an innovation that is important for anticipating the types of pressures that will affect the shelter system in the future.

In the next section, we provide some background, describing the homeless shelter system in Toronto. We then turn to describing our methodology and data. After presenting our results, we discuss what they imply about the role of homeless shelters in the broader social welfare system.

Background

The Shelter, Support & Housing Administration division of the City of Toronto delivers housing and homelessness services in partnership with community agencies by providing funding and coordinating services. These services are aimed at preventing and ending homelessness through a range of initiatives, partnerships, and supports that help people to access emergency shelters and to find and keep housing.

The Toronto shelter system includes close to 60 shelters and two central access points: Central Intake and the Streets to Homes Assessment and Referral Centre (SHARC). As of 2016, the system had close to 4,400 full-time beds, including both emergency and transitional shelter beds. The number of shelter beds fluctuates seasonally, with additional beds opened in winter, and over time as shelters open and close. Shelter referrals are made 24 hours a day, 365 days a year.

In 2010, the Shelter, Support & Housing Administration implemented the Shelter Management Information System (SMIS), a Web-based information and bed management platform that supports oversight and management of Toronto's shelter system. The SMIS is used by Central Intake, SHARC, and all emergency shelters in the system. SMIS holds client-level data on intakes, admissions and discharges, and basic demographics. All individuals who have accessed the shelter system since the implementation of SMIS are assigned a unique client identification number that enables unduplicated tracking over time and across the system. We use data drawn from the SMIS in this article.[6] As we describe in more detail in the next section, the data are daily and enable us to trace the movements of deidentified individuals as they move into and out of the shelter system.

The period described by our data (January 2011–December 2016) precedes the large influx of asylum seekers arriving in Toronto after crossing Quebec's border with the United States.[7] This influx has forced the shelter system to respond to an unexpected inflow of people in need of shelter, a response we do not capture in our analysis. However, the shelter system in Toronto is not new to experiencing pressures on its capacity. In reports to City Council (City of Toronto 2013a, 2013b, 2015), the Shelter, Support & Housing Administration has consistently reported the shelter system as being at or very near capacity in periods of peak demand. In January 2015, for example, the average shelter occupancy rate was approximately 93 percent, but it was higher in some sectors, particularly in co-ed and women's shelters. What's more, this capacity constraint does not ease during other parts of the year.[8] Concerns about capacity constraints are compounded by difficulties in forecasting the need for spaces. Particularly important in this regard is dealing with the consequences of unexpected severe weather when the system is consistently at or near capacity.[9] The city has a target occupancy rate of 90 percent in each emergency shelter sector.

Toronto must deal with issues common to all big-city shelter systems. These issues include the system having to deal with the criminal justice, child welfare, and health care systems choosing to discharge people into homelessness and, so, often into the shelter system.[10] It also includes the fact women and children fleeing domestic violence must often turn to emergency shelters as a first resort.[11] The length of stay in the shelter system is a major concern not only because such long stayers occupy shelter beds meant to be used for emergency purposes but also because chronicity is typically associated with mental and physical health, substance abuse, and advanced age, and emergency shelters are not well equipped to provide the enhanced services and help these people require.[12] Finally, Toronto must deal with the issue of a lack of affordable housing and the related problem of poverty. A recent

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report shows that in 2015, a lone parent with one child living in Toronto would have needed to devote 55 percent of social assistance income to paying rent on one of the least expensive one-bedroom apartments in the city. This is up from 37 percent in 1990 (Wilkins 2017).

For all of these reasons, in 2015 more than 16,000 different people accessed the Toronto shelter system at some point. It is important to understand that one should expect the intensity and pattern of shelter use to vary widely across these 16,000 people; some will be using a shelter for the first time and will stay for only a short period, whereas others will return to the shelter system and can be expected to stay for much longer. In the next section, we describe the analytical approach we use to categorize shelter users by the frequency and intensity of their shelter use.

Clustering Methodology

We use an analytical approach known as "k-mean clustering" to examine the nature of shelter use in Toronto. As noted earlier, the method is well established in the literature and is used to identify those who use homeless shelters by their frequency of use and length of stay. Table 1 summarizes the characteristics of the three types of shelter users traditionally defined: transitional, episodic, and chronic.

Transitional users of shelters do so only infrequently (few episodes), and the length of their typical stay is short. Episodic users of shelters make more frequent use of the shelter system, but, as with transitional users, each episode of shelter use is relatively short. So-called chronic users of shelters have few episodes, but their stay in a shelter is long.

The approach involves gathering information about entries and exits into and out of the homeless shelter system over a long period. The unit of observation is daily. Thus, a typical observation might be to identify person X as entering the shelter system on January 21 and exiting on March 25, re-entering on August 13, and so forth. The data also identify admissions and discharges into different programs and so provide a picture of movements within the shelter system.

The methodology involves examining the information provided on entries and exits by every individual using the shelter system over an entire, appropriately defined sample period. On the basis of these histories, shelter users are separated into the three groups: transitional, episodic, and chronic users of shelters. The separation of individuals into these groups is determined endogenously. That is, the method clusters individuals into groups in such a way that the shelter use of people allocated to each of the groups is clearly different in length of stay and frequency of use.

Table 1: Patterns of Shelter Stays

	Few Episodes	Many Episodes
Short stays	Transitional	Episodic
Long stays	Chronic	—

Note: Dash indicates not applicable.

As this description of the approach may suggest, the average length and average number of shelter stays that describe a chronic user of shelters in Toronto may be different from the average length and average number of shelter stays describing a chronic user of shelters in Calgary or New York City. It is therefore useful to compare the characteristic of transitional, episodic, and chronic users of shelters across cities. This is something we examine in what follows.

Applying the clustering methodology requires the clarification of some definitional issues. One must, for example, define a shelter "episode." We follow the practice in the literature of defining an episode as a period in a shelter that is separated from another period in a shelter by at least 30 days. Thus, if a person were to enter the shelter system on January 15, exit on January 25, enter again on February 2, and exit on February 24, the number of days in which this person stayed in shelters between January 15 and February 24 would define the number of days in a single episode, because the exit on January 25 and the entry on February 2 are separated by fewer than 30 days. Were this person to enter the shelter system again on May 2, this would define the start of a second episode because this new entry is more than 30 days since the last exit.

To apply the clustering methodology, we also need to define a cohort of individuals using the shelter system over a well-specified sample period. The beginning and end dates of the sample period, and the shelter histories of those we include in the sample, are determined by our having to "right-censor" the data to ensure the date of first entry into the system is at minimum 12 months before the end of the data set.[13] In other words, we need to ensure all persons are potentially exposed to shelter use for at least 12 months. As we explain next, meeting these criteria required that we omit some of the observations on shelter use provided to us.

Defining the Sample Period and Data Cleaning

Our data set contains 391,473 observations on 63,329 individuals spanning from October 22, 2009, to January 23, 2017. The data describe the date and the time of day that a person entered and exited a shelter.[14] Application of the cluster analysis requires that we omit some of these observations. That is, we must "clean" the data to remove observations that, for one reason or another, need to be excluded from the analysis so we can accurately identify patterns of shelter use. The first step is to clearly define a beginning and end date for our sample period.

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We define the start and end dates of our sample as 1 January 2011 and 31 December 2016, respectively, so that we have six complete calendar years of data. In doing so, we removed 1,644 observations after 31 December 2016, The chosen start date requires that we left-censor the data set to exclude some observations of shelter behaviour from before that date. In particular, we exclude observations on the shelter behaviour of those individuals who first entered the system before 1 January 2011.[15] This requires we omit 52,810 observations on 3,681 individuals.

To make an accurate assessment of whether a person can be identified as being a transitional, episodic, or chronic user of shelters, we require that the person have had the opportunity to use the shelter system for at least 12 months after first entry. This requires that we right-censor the data set to exclude observations on individuals who first entered the shelter system within 12 months of the end of our sample, 31 December 2016.

This adjustment requires that we omit 18,347 observations on 8,424 individuals.

In our analysis, we have tried to ensure we only consider observations of shelter use that can be reasonably understood as having actually involved using a shelter bed. Thus, we removed the following data:

- Observations on individuals who both entered and exited a shelter before 4:00 a.m. on the same day (to be clear, we define a day as a 24-hour period starting at midnight); thus, we exclude data describing someone who enters a shelter after midnight and exits before 4:00 a.m.;
- Observations on individuals who entered before 4:00 a.m. and exited less than 2 hours later; and
- Observations on individuals who entered a shelter after 4:00 a.m. on Day 1 and exited before 4:00 a.m. on Day 2, our assumption being that these individuals entered the shelter too late on Day 1 to use a bed and exited the shelter on Day 2 too soon to have used a bed.

Note that these three reasons for excluding observations make explicit that our focus is on characterizing the users of shelter beds. These excluded clients may have used shelter resources (they may have been fed, required security intervention, received aid, etc.), but we believe it is unlikely that they occupied a bed. These restrictions require that we eliminate 33,624 observations on 1,747 individuals.

Our next restriction is based on a recognition that in family shelters, the space allocated for sleeping is what one might describe as a "sleeping unit." Thus, a family is allocated a space that is more private than the single bed allotted a single person, and that space—or sleeping unit—may accommodate a large or a small family. In our analysis, we identify the number of households using shelters. A household may consist of a single person—which, as we show, is the majority of cases—or it may consist of a head of household accompanied by a spouse, dependents, or both. We assume that entries and exits of dependents and spouses are determined by the entries and exits of the head of household. Thus, we remove the following: observations of entries and exits of dependents and spouses. In other words, we consider entries and exits of single individuals and heads of household only.

Related to this issue is the treatment of people aged younger than 16 years on first entry into a shelter. We assume these people are dependents even though they are not recorded as "dependent" in the data provided to us. Thus, we remove the following: observations of people aged younger than 16 years on first entry. These latter two restrictions together require that we eliminate 13,332 observations on 9,655 individuals.

Finally, because of what we believe might be a minor coding error in the data, we eliminate observations when an individual is listed simultaneously as part of two or more types of shelter—that is, the person is sleeping in two beds at once. This requires that we eliminate 2,573 observations.

After all of these considerations, we ended up removing 122,330 observations on 23,507 individuals. What remains is still a very large sample of 269,143 observations on 39,822 households defining shelter use over January 1, 2011, to December 31, 2016.[16]

Determining How Patterns of Shelter Use Change over Time

The identification of shelter clients as transitional, episodic, or chronic depends on their frequency and intensity of use over several years. Within that period of analysis, the number of shelter clients so identified may change from year to year. To identify possible trends in the intensity of shelter use, it is useful to determine how the percentage of shelter users identified as transitional, episodic, and chronic changed over time.

To do this, we use the clustering methodology just described to identify each individual as a transitional, episodic, or chronic user of shelters. If person X has been identified as a chronic user of shelters and if X was using the shelter system in 2011 and 2012, then we add X to the number of chronic shelter users in 2011 and 2012. Similarly, if on the basis of her or his pattern of shelter use during our sample period person Y has been identified as an episodic user of shelters and if she or her used shelters in 2012 and 2015, then we add Y to the number of episodic shelter users in those years.[17]

Cluster Analysis Results

We begin our presentation of results by considering all users of all shelter types. We then turn to showing how patterns of shelter use vary by sector. That is, we show how patterns of shelter use differ across shelters provided

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Table 2: Patterns of Shelter Use, 2011–2016

Clusters	Transitional	Episodic	Chronic	Total
Sample size, no. (%)	34,024 (85.4)	2,733 (6.9)	3,065 (7.7)	39,822
Episodes, mean (SD)	1.4 (0.8)	7.5 (2.8)	2.3 (1.5)	1.9 (1.9)
Total days, mean (SD)	71.8 (91.9)	254.1 (209.5)	761.4 (339.2)	137.4 (231.7)
Days per episode, mean (SD)	55.3 (75.7)	34.9 (27.1)	466.3 (347.5)	85.5 (162.3)
Days per episode, %				
1–30	53.9	54.0	0.0	49.7
31–60	16.1	28.5	0.0	15.7
61–90	9.8	12.3	0.0	9.2
≥91	20.3	5.2	100.0	25.4
No. of episodes, %				
1	74.4	0.0	39.4	66.6
2	15.8	0.0	25.3	15.4
3	6.5	0.0	15.3	6.7
4	3.3	0.0	11.5	3.7
5	0.0	28.7	5.0	2.4
≥6	0.0	71.3	3.6	5.2
Occupied shelter sleeping units, no. (%)	2,443,382 (44.6)	694,426 (12.7)	2,333,757 (42.7)	5,471,565 (100)

Note: Percentages may not total 100 because of rounding.

Source: Shelter Management Information System data set and authors' calculations.

for use by single adults, for use by families, and for use by youth.

All Shelter Sectors

We begin by applying the clustering analysis to our complete sample of 269,143 observations on 39,822 households. Tables 2, 3, and 4 summarize the results.

Table 2 shows that of the 39,822 households using the Toronto shelter system over 2011–2016, by far the largest number—34,024 people or 85.4 percent of all users—can be classified as transitional shelter users: households who used the shelter system relatively infrequently and for relatively short stays. The people in these households experienced, on average, 1.4 episodes of shelter use over the 6 year period. The average transitional user of shelters stayed 71.8 days for an average episode lasting 55.3 days.

Most (53.9 percent) transitional users of shelters experienced episodes of between 1 and 30 days but for a sizable minority (20.3 percent) the average episode exceed 91 days or more. Most of transitional users (90.2 percent) experienced just one (74.4 percent) or two (15.8 percent) episodes of shelter use. Over the six-year period of our sample, transitional users of shelters occupied 44.7 percent of the available sleeping units.[18]

Of the 39,822 households using the Toronto shelter system over 2011–16, only 2,733—just 6.9 percent of all households using shelters—can be classified as episodic shelter users (i.e., households who used the shelter system more frequently and for longer episodes than transitional users). These households experienced, on average, 7.5 episodes of shelter use over the six-year period, with the average episode lasting 34.9 days. The average episodic user of shelters stayed 254.1 days in total. Most (71.8 percent) of episodic users experienced six or more episodes of shelter use, and all experienced five or more episodes. Episodic users occupied 12.7 percent of all sleeping units available over 2011–2016.

Finally, of the 39,822 households using the Toronto shelter system over 2011–2016, only 3,065—just 7.7 percent of all households using shelters—can be classified as chronic shelter users (i.e., households who used the shelter system for very long periods). On average, the people in these households experienced just 2.3 episodes of shelter use over the six-year period, but the average episode lasted 446.3 days. The average chronic shelter user stayed a total of 761.4 days over the six-year period of our sample. Most chronic shelter users experienced just 1 or 2 episodes. Chronic users, despite being only 7.7 percent of all shelter users, occupied 42.7 percent of all sleeping units available over 2011–2016 period.

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Table 3: Demographic Composition of Users of All Types of Shelters

Clusters	Transitional	Episodic	Chronic	Total
Unique clients, no.	34,024	2,733	3,065	39,822
Gender, %				
Male	60.9	81.4	67.7	62.8
Female	38.7	17.5	31.4	36.7
Transgender	0.5	1.2	0.9	0.5
Age,[a] mean (SD)	36.0 (13.7)	37.3 (12.8)	41.6 (15.4)	36.5 (13.9)
Age groups, %				
Youth (16–24 y)	25.9	20.8	20.4	25.2
Adult (25–49 y)	55.7	61.2	45.7	55.3
Older adult (50–64 y)	15.6	16.0	27.6	16.6
Senior (≥65 y)	2.8	2.1	6.3	3.0

Note: Percentages may not total 100 because of rounding.
[a] Age is defined as age on first entry into the shelter system.
Source: Shelter Management Information System data set and authors' calculations.

Table 4: Trends in Shelter Use, All Shelter Types, 2012–2015

Variable	2012	2013	2014	2015
Unique clients, no.	12,619	12,478	12,806	13,022
Gender, %				
Male	65.8	66.6	65.6	65.6
Female	33.8	32.7	33.6	33.6
Transgender	0.5	0.7	0.8	0.9
Age,[a] mean (SD)	38.1 (13.4)	38.1 (13.6)	37.7 (13.6)	37.2 (13.6)
Age groups, %				
Youth (16–24 y)	24.1	23.6	24.0	23.7
Adult (25–49 y)	56.0	54.6	54.1	54.7
Older adult (50–64 y)	17.0	18.6	18.6	18.1
Senior (≥65 y)	3.0	3.2	3.3	3.6
Clusters or patterns, %				
Transitional	72.3	67.1	66.3	68.1
Episodic	15.3	16.4	16.2	14.9
Chronic	12.4	16.4	17.5	17.0

Note: Percentages may not total 100 because of rounding.
[a] Age is defined as age on first entry into the shelter system.
Source: Shelter Management Information System data set and authors' calculations.

Table 3 summarizes the demographic characteristics of the head of household for each of the three categories of shelter user. There is not a sizable difference in gender breakdown between chronic and transitional users, but episodic users are significantly more heavily weighted toward men. The average age of the three categories of heads of household is not very different, although chronic users are somewhat older. A more noticeable difference is in terms of the age distribution: a significantly greater percentage of heads of household who are chronic users of shelters are older adults.

In Table 4, we show how shelter use changed over 2012–2015. We limit our attention to these years to ensure that our need to left- and right-censor the data does not create a bias in our calculations of the allocation of households among transitional, episodic, and chronic users of the shelter system.[19]

The first notable observation is that the number of households using the shelter system did not change a great deal from year to year over this period.[20] The gender distribution did not change, and the average age and the age distribution of heads of household was more or less constant. A notable change that did occur over the four-year period of our sample is the decrease in the percentage of households identified as transitional users and a similarly sized increase in the percentage of households identified as chronic users.

Shelters Provided for Use by Single Adults

By far the largest part of the Toronto shelter system—as it is in every city's shelter system—is that provided for use by single adults. In our cleaned sample, 68.7 percent of all households who used shelters over the 2011–2016 period used those provided for single adults. Table 5 summarizes the results of our cluster analysis on this sub-group.

Of the 27,358 individuals using shelters provided for single adults, the largest number—22,864 people or 83.6 percent—can be classified a transitional shelter users (people who used the shelter system relatively infrequently and for relatively short stays). These people experienced, on average, 1.5 episodes of shelter use over the six-year period. The average transitional user of shelters stayed 68.9 days for an average episode lasting 50.3 days.

Most (60.6 percent) transitional users of single adult shelters experienced episodes of between 1 and 30 days, but for a sizable minority (17.4 percent), the average episode exceeded 91 or more days. Most transitional users (90.2 percent) experienced just one (70.3 percent) or two (17.9 percent) episodes of shelter use. Over the six-year period of our sample, transitional users of shelters occupied 40.3 percent of the available shelter beds provided for single adults.

Among users of shelters provided for single adults, only 2,405 people—just 8.8 percent of those using single adult shelters—can be classified as episodic shelter users. These people experienced, on average, 7.5 episodes of shelter use over the six-year period with the average episode lasting 33.9 days. The average episodic user of shelters stayed 245.2 days in total. Most (71.1 percent) single adult episodic users experienced six or more episodes of shelter use, and 99.2 percent experienced five or more episodes.

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Table 5: Patterns of Shelter Use, Single Adult Shelters

Clusters	Transitional	Episodic	Chronic	Total
Sample size, *N* (%)	22,864 (83.6)	2,405 (8.8)	2,089 (7.6)	27,358
Episodes, mean (SD)	1.5 (0.8)	7.5 (2.9)	2.4 (1.6)	2.1 (2.1)
Total days, mean (SD)	68.9 (97.5)	245.2 (208.1)	835.0 (357.6)	142.9 (252.2)
Days per episode, mean (SD)	50.3 (78.2)	33.9 (27.7)	507.3 (381.4)	83.8 (176.5)
Days per episode, %				
1–30	60.6	56.8	0.0	55.6
31–60	14.1	25.8	0.0	14.0
61–90	8.0	11.4	0.0	7.7
≥91	17.4	5.9	100.0	22.7
No. of episodes, %				
1	70.3	0.0	39.2	61.8
2	17.9	0.0	24.7	16.8
3	7.7	0.0	14.6	7.5
4	4.1	0.8	10.5	4.3
5	0.0	28.1	5.6	2.9
≥6	0.0	71.1	5.4	6.7
Occupied beds, no. (%)	1,575,395 (40.3)	589,635 (15.1)	1,744,356 (44.6)	3,909,386

Note: Percentages may not total 100 because of rounding.

Source: Shelter Management Information System data set and authors' calculations.

Episodic users occupied 15.1 percent of all shelter beds available to single adults over 2011–2016 period.

Finally, only 2,089 people—7.6 percent of all users of single adult shelters—can be classified as chronic shelter users (people who used the shelter system for very long periods). On average, these people experienced just 2.4 episodes of shelter use over the six-year period, but the average episode lasted 507.3 days. The average chronic shelter user stayed a total of 835.0 days over the six-year period of our sample. Most chronic shelter users experienced just one or two episodes. Chronic users, despite being only 7.6 percent of all users of single adult shelters, occupied 44.6 percent of all single adult shelter beds.

Single Adult Shelter Use: Toronto versus Other Cities

As we noted earlier, the methodology we use involves examining the information provided on entries and exits by individuals using the shelter system and, on the basis of these histories, allocates shelter users into one of the three groups: transitional, episodic, and chronic users of shelters. The separation of individuals into these groups is determined endogenously and is dependent on the pattern of shelter use of all those included in the analysis. As a result, the average length and average number of shelter stays describing a chronic, episodic, or transitional user of shelters in Toronto will be unique to that city and will in general be different from the average length and average number of shelter stays describing a chronic, episodic, or chronic user of shelters in another city. This is useful to emphasize because it means there is no single definition of what constitutes a chronic (or transitional or episodic) shelter user that applies across all jurisdictions.

Table 6 reports results from other studies of shelter use in large urban centers similar to our study of shelter use in Toronto. In all cases, the summary of results describes use of shelters by single adults only.

In all four centers, transitional users of shelters clearly predominates. The number of episodes of shelter use by transitional users is quite similar across the four cities, although the average number of days per episode is noticeably larger in Toronto and New York than it is in Calgary and Philadelphia. With respect to the percentage of single adults classified as chronic users of shelters, Toronto is much more like New York and Philadelphia than Calgary. Of note is that the average length of episode among chronic users of single adult shelters is far longer in Calgary and Toronto than it is in New York and Philadelphia. In all cities, chronic shelter users, despite their relatively small number, occupy a large percentage of shelter beds. Broadly speaking, except for the average length of episode for chronic users, single adult shelter

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Table 6: Comparison of Patterns of Single Adult Shelter Use in Four Cities

	Clusters		
City	Transitional	Episodic	Chronic
Toronto			
n (%)	22,864 (83.6)	2,405 (8.8)	2,089 (7.6)
No. of episodes, mean	1.5	7.5	2.4
No. of days per episode, mean	50.3	33.9	507.3
% of occupied beds	40.3	15.1	44.6
Calgary			
n (%)	28,344 (86.0)	4,097 (12.4)	531 (1.6)
No. of episodes, mean	1.7	8.3	3.5
No. of days per episode, mean	15.1	113.4	927.1
% of occupied beds	31.0	33.5	35.5
New York			
n (%)	59,367 (81.0)	6,700 (9.1)	7,196 (9.8)
No. of episodes, mean	1.4	4.9	2.3
No. of days per episode, mean	42.4	54.4	280.9
% of occupied beds	35.1	18.1	46.9
Philadelphia			
n (%)	5,415 (78.5)	805 (11.7)	677 (9.8)
No. of episodes, mean	1.2	3.8	1.5
No. of days per episode, mean	17.1	18.9	164.8
% of occupied beds	32.5	17.2	50.2

Note: Percentages may not total 100 because of rounding.

Source: Calculations for Toronto are from this study. Calculations for Calgary are from Kneebone et al. (2015). Calculations for New York and Philadelphia are from Kuhn and Culhane (1998).

use in Toronto is quite similar to single adult shelter use in New York and Philadelphia. Calgary seems to be the outlier in this four-city comparison.

Demographic Characteristics of Clients of Adult Shelters in Toronto

Focusing again on the use of adult single shelters in Toronto, Table 7 summarizes the demographic characteristics of the three categories of shelter user. Among users of single adult shelters, there is no noticeable difference in gender breakdown between chronic and transitional users, but episodic users are significantly more heavily weighted toward men. The average age of the average transitional and episodic user of single adult shelters is similar, but chronic users are noticeably older, on average.

Table 7: Demographic Composition of Single Adult Shelters

Clusters	Transitional	Episodic	Chronic	Total
Unique clients, no.	22,864	2,405	2,089	27,358
Gender, %				
Male	71.3	83.0	73.3	72.5
Female	28.1	16.1	25.8	26.9
Transgender	0.6	0.9	0.9	0.6
Age,[a] mean (SD)	40.7 (12.8)	40.0 (11.4)	47.5 (12.3)	41.1 (12.8)
Age group, %				
Youth (16–24 y)	8.6	8.2	1.7	8.1
Adult (25–49 y)	65.7	71.1	53.5	65.2
Older adult (50–64 y)	21.9	18.2	36.4	22.7
Senior (≥65 y)	3.8	2.4	8.3	4.0

Note: Percentages may not total 100 because of rounding.

[a] Age is defined as age on first entry into the shelter system.

Source: Shelter Management Information System data set and authors' calculations.

Table 8: Trends in Single Adult Shelter Use, 2012–2015

Variable	2012	2013	2014	2015
Unique clients, no.	8,703	9,023	9,223	9,553
Gender, %				
Male	76.5	75.7	73.7	72.8
Female	22.9	23.6	25.5	26.4
Transgender	0.6	0.8	0.9	0.9
Age,[a] mean (SD)	42.1 (11.5)	41.9 (11.9)	41.5 (11.8)	40.7 (12.1)
Age group, %				
Youth (16–24 y)	6.4	7.0	6.6	7.0
Adult (25–49 y)	66.5	64.1	64.1	64.8
Older adult (50–64 y)	23.4	24.7	24.9	23.5
Senior (≥65 y)	3.8	4.1	4.5	4.8
Clusters or patterns, no.				
Transitional	67.7	63.7	62.8	65.6
Episodic	19.3	20.0	19.8	17.9
Chronic	13.0	16.2	17.3	16.5

Note: Percentages may not total 100 because of rounding.

[a] Age is defined as age on first entry into the shelter system.

Source: Shelter Management Information System data set and authors' calculations.

This difference in average age is reflected in the differences in the reported age distributions; a much greater percentage of chronic shelter are older adults.

In Table 8, we show how single adult shelter use changed over 2012–2015. Notable here are the increases in the number of shelter users (an increase of 850 individuals, or 9.8 percent, from 2012 to 2015) and the increase in

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the percentage of single adult shelter users classified as chronic users (from 13 percent to 16.5 percent). The gender distribution did not change a great deal, and the average age and the age distribution of single adult shelter users was more or less constant.

Youth Sector Shelters

Our data allow us to evaluate the shelter use of the 8,000 individuals aged 16–24 years at the time of their first entry into the shelter system who stayed in shelters provided for youth over 2011–2016.[21] These 8,000 individuals experienced 43,224 episodes in these shelters.

The interpretation of the data are similar to what is reported in the previous tables. The results reported in Table 9 show that the distribution of youth shelter users among transitional, episodic, and chronic is not noticeably different from what we observe with respect to single adults. The great majority are transitional users. However, we find it interesting that transitional and chronic users of youth shelters experience episodes that are noticeably shorter than those experienced by transitional and chronic users of adult shelters. This shows the importance of examining adult and youth shelters separately. In all other respects, however, patterns and intensity of use of youth and adult shelters are quite similar. When it comes to the number and average length of shelter episodes, episodic users of youth shelters are nearly indistinguishable from episodic users of adult shelters.

The demographic composition of youth shelters is quite different from that of adult shelters. As reported in Table 10, the percentage of female youth shelter clients is significantly higher than that of female adult shelter clients, and it is in youth shelters that we first see a noticeable percentage of transgender clients.

Finally, in Table 11, we show the trend in the use of youth shelters. As was the case with respect to adult

Table 9: Patterns of Shelter Use: Youth Shelters

Clusters	Transitional	Episodic	Chronic	Total
Sample size, no. (%)	6,545 (81.8)	652 (8.2)	803 (10.0)	8,000
Episodes, mean (SD)	1.3 (0.6)	5.6 (2.1)	2.07 (1.1)	1.7 (1.5)
Total days, mean (SD)	45.6 (65.3)	209.1 (165.6)	541.9 (238.0)	108.7 (185.2)
Days per episode, mean (SD)	35.4 (53.3)	37.4 (26.5)	329.7 (205.8)	65.1 (120.2)
Days per episode, %				
1–30	67.1	47.2	0.0	58.7
31–60	13.5	33.0	0.0	13.7
61–90	7.6	14.7	0.6	7.5
≥91	11.8	5.1	99.4	20.1
No. of episodes, %				
1	77.8	0.0	37.9	67.4
2	15.9	0.0	31.3	16.2
3	6.3	0.0	20.7	7.3
4	0.0	39.3	7.6	4.0
5	0.0	23.2	1.6	2.1
≥6	0.0	37.6	1.0	3.2
Occupied beds, no. (%)	298,534 (34.3)	136,305 (15.7)	435,111 (50.0)	869,950

Note: Percentages may not total 100 because of rounding.

Source: Shelter Management Information System data set and authors' calculations.

Table 10: Demographic Composition of Youth Shelters

Clusters	Transitional	Episodic	Chronic	Total
Unique clients, no.	6,545	652	803	8,000
Gender, %				
Male	59.1	67.3	65.0	60.3
Female	40.3	30.2	33.7	38.8
Transgender	0.7	2.5	1.2	0.9
Age,[a] mean (SD)	20.3 (3.1)	19.4 (2.2)	19.9 (2.4)	20.2 (3.0)
Age group, %				
Youth (16–24 y)	98.6	99.8	99.4	98.8
Adult (25–49 y)	1.3	0.2	0.6	1.1
Older adult (50–64 y)	0.1	0.0	0.0	0.1
Senior (≥65 y)	0.0	0.0	0.0	0.0

Note: Percentages may not total 100 because of rounding.

[a] Age is defined as age on first entry into the shelter system.

Source: Shelter Management Information System data set and authors' calculations.

Table 11: Trends in Youth Shelter Use, 2012–2015

Variables	2012	2013	2014	2015
Unique clients, no.	2,424	2,252	2,400	2,334
Gender, %				
Male	61.6	61.9	61.8	62.7
Female	37.8	37.0	36.8	35.7
Transgender	0.6	1.1	1.4	1.5
Age,[a] mean (SD)	20.0 (2.5)	19.9 (2.4)	19.6 (2.3)	19.3 (2.3)
Age group, %				
Youth (16–24 y)	98.7	99.0	99.5	99.6
Adult (25–49 y)	1.2	0.8	0.5	0.4
Older adult (50–64 y)	0.1	0.1	0.0	0.0
Senior (≥65 y)	0.0	0.0	0.0	0.0
Clusters or patterns, no.				
Transitional	68.4	62.9	62.8	64.3
Episodic	16.6	17.8	16.7	15.6
Chronic	15.0	19.3	20.5	20.2

Note: Percentages may not total 100 because of rounding.

[a] Age is defined as age at first entry into the shelter system.

Source: Shelter Management Information System data set and authors' calculations.

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shelters, over time the gender mix of youth shelter users does not change significantly. Once again, the notable change over time has been the increase in the percentage of all youth shelter users who can be classified as chronic; a 33 percent increase during the four year period 2012 to 2015. With such users experiencing an average stay of 330 days per episode (see Table 9), this is a worrisome trend.

Shelters Provided for Use by Families

The final sector to be analyzed is that part of the shelter system intended to be used by families. As noted in the "Introduction" section, this is to our knowledge the only application of cluster analysis to family shelter use in Canada. This examination seems overdue. Segaert (2012) reports that between 2005 and 2009, shelter use by children increased by more than 50 percent across Canada—from 6,206 to 9,459—making families the fastest growing subgroup of the homeless population over that period. Segaert (2017) reports that across Canada, the typical stay in a family shelter in Canada increased from 8.3 days in 2005 to 22 days in 2014.

Our focus on shelter use by families means we deal with a much smaller set of data. It important to understand that the data set we use is limited to heads of household only; we exclude from the data their spouses and dependents. Thus, should we report, say, 100 chronic users of family shelters, we mean that we have identified 100 heads of household using family shelters. Those 100 heads of household have a spouse, children, or both using the shelter with them.[22] Table 12 summarizes the results of our cluster analysis of users of family shelters.

When it comes to family shelters, transitional users are even more heavily represented than in single adult and youth shelters. For 88.6 percent of families, there was just one episode in the shelter system. However, more than one-third of those episodes lasted 91 or more days. Two-thirds of all sleeping units in family shelters were occupied by transitional users.

Table 13 highlights a key difference between family shelters and those provided for single adults and youth, namely the very large percentage of heads of household who are female. Also noteworthy is the fact family shelters are dominated by heads of family aged 16–49 years. Very few heads of family in family shelters are aged more than 49 years—something quite different from what is observed in shelters provided for single adults.

Table 14 illustrates the same trend toward a greater percentage of chronic users of family shelters that we saw in single adult and youth shelters. Combined with the observation noted in Table 13, this means there is a trend toward a growing number of chronic users of family shelters headed by young women.

Table 12: Patterns of Shelter Use, Family Shelters

Clusters	Transitional	Episodic	Chronic	Total
Sample size, no. (%)	6,011 (88.6)	442 (6.5)	335 (4.9)	6,788
No. of episodes, mean (SD)	1.0 (0.0)	2.2 (0.5)	1.0 (0.2)	1.1 (0.3)
Total days, mean (SD)	75.8 (62.1)	197.5 (134.2)	504.0 (212.6)	104.9 (126.4)
Days per episode, mean (SD)	75.8 (62.1)	91.1 (60.9)	488.2 (202.2)	97.2 (116.7)
Days per episode, %				
1–30	26.7	16.1	0.0	24.7
31–60	24.5	19.9	0.0	23.0
61–90	16.5	19.7	0.0	15.9
≥91	32.3	44.3	100.0	36.4
No. of episodes, %				
1	100.0	0.0	96.1	93.3
2	0.0	85.1	3.9	5.7
3	0.0	12.4	0.0	0.8
4	0.0	2.0	0.0	0.1
5	0.0	0.2	0.0	0.0
≥6	0.0	0.2	0.0	0.0
Occupied sleeping units, no. (%)	455,794 (64.0)	87,290 (12.3)	168,847 (23.7)	711,931

Note: Percentages may not total 100 because of rounding.

Source: Shelter Management Information System data set and authors' calculations.

Table 13: Demographic Composition of Family Shelters

Clusters	Transitional	Episodic	Chronic	Total
Unique clients, no.	6,011	442	335	6,788
Gender, %				
Male	25.0	8.1	14.9	23.4
Female	74.9	91.9	85.1	76.5
Transgender	0.1	0.0	0.0	0.1
Age,[a] mean (SD)	34.0 (10.8)	31.1 (10.0)	36.4 (9.8)	33.9 (10.8)
Age group, %				
Youth (16–24 y)	72.7	62.4	79.4	72.4
Adult (25–49 y)	6.5	4.8	10.1	6.6
Older adult (50–64 y)	1.7	0.5	0.9	1.6
Senior (≥65 y)	19.0	32.4	9.6	19.4

Note: Percentages may not total 100 because of rounding.

[a] Age is defined as age at first entry into the shelter system.

Source: Shelter Management Information System data set and authors' calculations.

Summary and Discussion

A good deal of information has been provided in the tables presented and discussed above. Table 15 summarizes and highlight some key results.

The pattern and intensity of family shelter use is noticeably different from that of shelter use by youth and by single adults. Chronic use is considerably less in family than it is in youth and single adult shelters. Although

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Table 14: Trends in Family Shelter Use, 2012–2015

Variables	2012	2013	2014	2015
Unique clients, no.	1,986	1,642	1,633	1,658
Gender, %				
Male	21.4	21.1	22.4	22.9
Female	78.5	78.9	77.6	77.0
Transgender	0.1	0.0	0.0	0.2
Age,[a] mean (SD)	33.8 (11.0)	33.1 (10.7)	33.3 (10.6)	33.9 (10.5)
Age group, %				
Youth (16–24 y)	19.2	22.1	19.8	17.9
Adult (25–49 y)	72.2	69.9	72.6	73.4
Older adult (50–64 y)	6.1	6.4	6.7	7.4
Senior (≥65 y)	2.5	1.6	0.9	1.3
Clusters or patterns, no.				
Transitional	85.4	77.9	76.4	78.3
Episodic	9.4	12.2	11.3	10.6
Chronic	5.2	9.9	12.3	11.1

Note: Percentages may not total 100 because of rounding.
[a] Age is defined as age at first entry into the shelter system.

Source: Shelter Management Information System data set and authors' calculations.

Table 15: Summary of Key Findings from Cluster Analysis

Clusters	Transitional	Episodic	Chronic
All shelters			
N (%)	34,024 (85.4)	2,733 (6.9)	3,065 (7.7)
No. of episodes, mean	1.4	7.5	2.3
Length of episode, days, mean	55.3	34.9	466.3
Sleeping units occupied,[a] %	44.7	12.7	42.7
Single adult shelters			
N (%)	22,864 (83.6)	2,405 (8.8)	2,089 (7.6)
No. of episodes, mean	1.5	7.5	2.4
Length of episode, days, mean	50.3	33.9	507.3
Sleeping units occupied,[a] %	40.3	15.1	44.6
Family shelters			
N (%)	6,011 (88.6)	442 (6.5)	335 (4.9)
No. of episodes, mean	1.0	2.2	1.0
Length of episode, days, mean	75.8	91.1	488.2
Sleeping units occupied,[a] %	64.0	12.3	23.7
Youth shelters			
N (%)	6,545 (81.8)	652 (8.2)	803 (10.0)
No. of episodes, mean	1.3	5.6	2.1
Length of episode, days, mean	35.4	37.4	329.7
Sleeping units occupied,[a] %	34.3	15.7	50.0

Note: The sum of shelter users in the single adult, family, and youth shelters (42,146) exceeds the number reported for all shelters (39,822) because a youth (aged 16–24 y) may, over 2011–2016, have used all three sectors. Because we examine the data by sector, such a person is included in our analysis of each of these sectors. Percentages may not total 100 because of rounding.
[a] *Percentage of sleeping units occupied* is the share of all sleeping units provided by that shelter program occupied by transitional, episodic, and chronic users.

Source: Shelter Management Information System data set and authors' calculations.

two-thirds of family shelter beds are used by a family just once, that one episode is quite long—an average of nearly 76 days.

The largest part of the Toronto shelter system is that provided for use by single adults. In that part of the shelter system, nearly 45 percent of sleeping units are occupied by just 7.6 percent of shelter users—those identified as being chronic users. However, nearly 84 percent of single adult shelter users—those identified as transitional users—use only 40 percent of sleeping units. As summarized in Table 6, the pattern and intensity of shelter use by single adults varies by city. Although we observe broad similarities in shelter use in Toronto relative to New York, Philadelphia, and Calgary, there are also important differences. In their comparison of shelter use in Denmark and the United States, Benjaminsen and Andrade (2015) suggest that differences in welfare regimes explain differences in patterns of shelter use. Because welfare regimes vary across provinces, particularly as they pertain to levels of support provided to single individuals, families, and people with disabilities, we would caution against policy responses that assume patterns of shelter use are the same across major cities. What is more, the differences in shelter use in smaller urban or rural centres may be very different again.

The pattern of use in youth shelters is remarkable in the very large fraction of sleeping units (50 percent) occupied by the 10 percent of youth who are classified as chronic users of youth shelters. The issue of youth homelessness deserves particular attention because it raises questions about what policies might be required to prevent those experiencing homelessness as a youth from doing so as an adult. A closely related question not limited to youth homelessness is the question of what actions might be taken to halt or slow the "graduation" of transitional users of shelters to episodic users and of episodic users to chronic users. What is more, in a world of limited resources, is it best to target rapid rehousing of episodic users most at risk of a long-term dependence on emergency shelters or to target chronic users?

Finally, not highlighted in Table 15, but an important finding, is the growth in the share of shelter clients classified as chronic users in all shelter sectors over the four-year period 2012–2015. This is a worrisome trend because

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so-called chronic users occupy a disproportionate share of beds. A growing number of chronic shelter users will strain the ability of the shelter system to provide shelter to those seeking temporary relief while they re-establish themselves into housing.

Conclusion

In this article, we examined a great deal of data describing the use of Toronto's system of homeless shelters. By applying a methodology known as k-mean cluster analysis, we have characterized shelter use according to whether someone is an occasional or a more frequent user of the shelter system. The size and breadth of our data set has allowed us to identify differences in shelter use according to the type of shelter accessed (single adult, youth, and family), and we have been able to identify the age and gender characteristics of shelter users. Understanding differences in the pattern and intensity of shelter use by type of shelter and by age and gender is key to developing practical and well-targeted solutions to the problem of homelessness. Identifying how chronicity of shelter use is changing over time is also important for efforts to identify reasons for changes in shelter use.

We have identified that the great majority of people who use emergency shelters are transitional shelter users, and for these people emergency shelters are, by and large, functioning as they should—as an emergency source of shelter. This finding suggests that most people using shelters are doing so because of poverty and being unable as a result of their poverty to spend on housing an amount that leaves them enough income to meet life's other necessities. As Raphael (2010) notes, the theoretical connection among homelessness, income, and housing market conditions is straightforward: Even if one can pay for the minimum quality of housing available in a city, if there is little income left over for other of life's necessities (food, clothing, etc.), one might rationally choose to forgo conventional housing and try one's luck doubling up with relatives or friends or temporarily using a city's shelter system. An obvious implication is that although it is perhaps fair comment to suggest that the shelter system might be made more responsive and more effective, the fact of the matter is that the shelter system does not operate in isolation. Shelters will remain overburdened if there is not sufficient commitment from governments and their agencies to effectively promote affordable housing and reasonable levels of income assistance.[23]

Our empirical results suggest, however, that only one-third of shelter beds are being used for short-term emergency housing. Two-thirds of emergency shelter beds are being used by chronic and episodic users. Well-designed and effective program interventions targeted to chronic users of shelters therefore have the potential to lead to a substantial reduction in the required number of shelter beds. Targeting effective responses to the needs of chronic users of shelters—perhaps in the form of treatment of mental illness and substance abuse and promoting child welfare—have the potential to close or make available for other uses about one-third of all shelter beds. The attraction of such a targeted intervention is enhanced by the recognition that providing stable, supportive housing for these individuals would generate savings in the form of reduced interactions with the legal, justice, and health care systems.[24]

Whether one considers transitional, episodic, or chronic users of shelters, reducing the number of shelter users therefore demands a response by governments and agencies outside the shelter system. As emphasized by Culhane (1992) more than a quarter century ago, the fate of the shelter system is tied to the functioning of the social welfare system because the latter determines the flows into and out of the shelter system. Focusing solely on the policies of the shelter system neglects the key roles played by social assistance, affordable housing, and health policies. Simply put, homeless shelters are a response to a problem, they are not the cause of nor are they the solution to that problem.

Gaining an understanding of patterns of emergency shelter use and the characteristics of those using shelters is important for understanding what policy responses and program interventions are appropriate. We are conscious of having raised more questions than we have answered. We hope that the patterns and trends of shelter use that we have identified will spur more research into a growing and particularly damaging social problem.

Acknowledgements

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Notes

1 See, for example, Burt (1993), Fitzpatrick (2005), and Gould Ellen and O'Flaherty (2010).

2 For an extensive survey of all the factors contributing to homelessness, see Nooe and Patterson (2010).

3 Advocates and researchers have long challenged the appropriateness of the City of Toronto's response to the social ill of homelessness. O'Grady, Gaetz, and Buccieri (2013) describe patterns and trends in the enforcement of the *Ontario Safe Streets Act* and argue that the act is a misguided public policy response to the issue of visible homelessness in Toronto and is not driven by evidence of increasing crime rates or public complaints. More recently, the Ontario Coalition Against Poverty (2016) released a report demanding a better response of the shelter system to weather-related demands for shelter beds. By providing a careful examination of the very large dataset describing shelter use in Toronto, we hope to provide an empirical foundation for informed debate and discussion of policy alternatives.

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4 Aubry et al. (2013) combine data on youth and adult shelters and do not report how patterns and intensity of use may differ across these types of shelters.
5 Culhane et al. (2007) investigates patterns and intensity of use of shelters by families in four US jurisdictions.
6 Not included in our data is information on the use of beds provided by faith-based groups who provide additional space between November 15 and April 15 through the Out of the Cold program. In 2013, these groups provided an average of 88 spaces per night. Also not measured are the experiences of people who seek access to shelter too late in the day (after 4:00 a.m.) to be accommodated without undue disruption to others or who arrive at SHARC seeking shelter but present with behaviours that make transferring them to shelter dangerous or difficult. These people spend the night sleeping at SHARC and so do not appear in the SMIS data (City of Toronto 2013a).
7 See Rieti (2018). The rise in the number of people using the shelter system after December 2016 can be observed in the data reported by the City of Toronto (2018a).
8 In 2017, for example, the occupancy rate across all shelter sectors was 93 percent in January and in July. Calculated using Daily Shelter Occupancy for 2017 (City of Toronto 2018b). By way of comparison, in 2017 occupancy rates in Calgary's shelter system averaged 81 percent with a maximum of 94 percent reached only in January (calculated from Alberta Government (n.d.).
9 Weather conditions influence the decisions of rough sleepers—those who, for a variety of reasons, choose to sleep out of doors until forced to use a shelter. Jadidzadeh and Kneebone (2015) identify and measure this influence on the choices of rough sleepers in Calgary. See Corinth and Lucas (2017) for US evidence.
10 The City of Toronto (2013b) reports that in 2012, approximately 4 percent, or 2,060, of the requests for emergency shelter were as a result of discharges from institutions.
11 The City of Toronto (2013b) reports that in 2012, Toronto's emergency shelter system admitted more than 840 unique clients self-reporting that they were fleeing violence. A large number of these were women and children. This translated to 5 percent of all admissions to the emergency system.
12 Milaney, Williams and Dutton (2018) report that in Calgary long stayers in shelters score poorly on measures meant to identify childhood trauma. Very few have ever had access to care or support.
13 The reason for the last restriction is explained in the next section.
14 The data also identify shelter users by age, family status, and gender. We make use of this information in our analysis.
15 The data provided to us include observations of those people who exited the shelter system after January 1, 2011, and the dates when those individuals first entered the shelter system. Some of these people first entered the shelter system as far back as October 22, 2009. We did not, however, include these observations in the cluster analysis. The reason for excluding these observations is that the data provided to us do not include observations of shelter use by people who first entered the shelter system before January 1, 2011, and also exited the system before that date. Thus, of all those who entered the shelter system between October 22, 2009, and December 31, 2010, only the history of relatively long stayers—those who did not finally exit until sometime in 2011—are included in the dataset provided to us. Were we to include those observations in our cluster analysis, we would bias the results and conclude there was a greater percentage of shelter users classified as "chronic" than was actually the case. Although protecting us from overstating the number of chronic shelter users, left-censoring may overstate the number of transitional users (and understate the number of episodic users) in the first year of our sample, 2011, because a person we identify as starting a new episode in early January 2011 may in fact be continuing an episode started in late 2010. The data provided to us do not enable us to "see" the start of that episode, thus causing us to determine the episode to have been shorter than was in fact the case.
16 By way of comparison, in their study of emergency shelter use by single adults in New York City, the data cleaning Kuhn and Culhane (1998) were required to do reduced their sample from 148,834 to 73,263 clients.
17 It is possible for a person X to have behaved in a way more closely associated with a transitional user of shelters in the first year of the sample but behaved in a way more closely associated with a chronic user of shelters in the latter years. The clustering methodology requires that we make a judgement regarding X's shelter use based on shelter use over the entire period for which we have observations about him. It is the nature of his behaviour over that entire period that determines his classification as a chronic shelter user. To determine whether and how a person's shelter behaviour has perhaps changed between classifications is an interesting but very challenging dynamic programming problem. To the best of our knowledge this issue has not been addressed in the literature.
18 Recall that a sleeping unit may consist of a bed (for single person) or a semiprivate unit (for a family).
19 See footnote 16 for discussion of how left- and right-censoring of the data make interpretation of annual results for 2011 and 2016 problematic.
20 Note that for this table we use our cleaned data set. Thus, the number of shelter users reported in 2015 is less than the number reported in the "Background" section.
21 These individuals were reported to have no dependents.
22 The data provided to us suggest that a total of 16,598 individuals (heads of household plus spouses and dependents) stayed in family shelters from 2011 to 2016. The data do not allow us to identify for every head of household the number of dependents in that household. This prevents us from identifying the number of people (head of household plus dependents) in each of the transitional, episodic, and chronic categories.
23 See Kneebone and Wilkins (2016) for estimates of the potential for poverty reduction efforts to affect shelter use in Canada.
24 For evidence of this, see Goering et al. (2014).

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